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Diversity and larval leaf-mining habits of Japanese jewel beetles of the tribe Tracheini (Coleoptera, Buprestidae)

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Abstract

From the Japanese Archipelago, 12 *Habroloma* and 20 *Trachys* species (Buprestidae: Tracheini) have been recorded. Two new *Habroloma* species were found, which are associated with Elaeocarpaceae and Loranthaceae, also new host plant families/orders for Tracheini. The two new species are described as *Habroloma elaeocarpusi* **sp. nov.** and *Habroloma taxillusi* **sp. nov.**, and the latter is the first Tracheini species shown to be associated with epiphytes. Leaf mines of 31 Tracheini species are also reported in this work, including new records of leaf mines for 16 Tracheini species. The larvae of all these recorded species are full-depth linear-blotch mesophyll miners of mature leaves and pupate within their mines. The mining habits of *Habroloma* species associated with *Symplocos* (Symplocaceae) are unique: the young larvae bore into midribs and petioles and cause leaf fall, and the larvae then mine the fallen leaves.

Keywords

Agrilinae, *Habroloma*, leaf miner, mining pattern, *Symplocos*, *Trachys*

Introduction

The coleopteran family Buprestidae is a species-rich clade whose larvae are xylophagous wood-borers, while the leaf-mining habit has evolved (Hering 1951). The tribe Tracheini of the subfamily Agrilinae is one of these leaf-mining clades and has great diversity, especially in Asia, Europe, and Africa. The two genera of Tracheini, *Trachys* and

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Habroloma, comprise more than 650 and 300 species worldwide, respectively (Bellamy 2008). Continental Asia is home to diverse trachyine species (Obenberger 1918, 1929) and the number of trachyine species has been underestimated. In recent years, 14 *Trachys* and 33 *Habroloma* species have been newly described from China (Peng 2020, 2021a, b, c, d, 2022a, b). By contrast, the Japanese Archipelago harbors 20 *Trachys* and 12 *Habroloma* species (Buprestidae: Tracheini) (Ohmomo and Fukutomi 2013), and no new taxa have been added since the monograph by Kurosawa (1959).

Leaf-mining habits in Buprestidae are believed to have evolved from wood-boring habits (Frost 1924), and the switch from wood-boring to leaf-mining has occurred several times in Buprestidae (Evans et al. 2015). The leaf-mining habits of Japanese trachyine species are characterized by full-depth blotch mining of the leaves of woody plants such as *Malus*, *Rosa*, *Prunus*, *Ulmus*, *Zelkova*, *Aphananthe*, *Broussonetia*, *Quercus*, *Castanopsis*, *Platycarya*, *Salix*, and *Deutzia*, or subwoody climbing plants such as *Pueraria*, *Amphicarpaea*, and *Desmodium* (Yano 1952), while in Europe many leaf-mining trachyine species are associated with herbaceous plants such as *Fragaria*, *Potentilla*, *Scabiosa*, *Stachys*, *Malva* (Frost 1924), and *Geranium* (Schaefer 1950).

Of the 32 Japanese trachyine species, host plants have been reported for 28 (Ohmomo and Fukutomi 2013). The known host plants belong to seven angiosperm orders: Fabales (3 spp.), Rosales (13. spp.), Fagales (5 spp.), Malpighiales (2 spp.), Malvales (1 sp.), Cornales (2 spp.), and Ericales (2 spp.). The host plant records are based mainly on observations of adult beetles feeding, with immature stages and leaf mines being reported only for nine *Trachys* and four *Habroloma* species in Japan (Yano 1952).

To shed light on the diversity and host plant associations of trachyine species in Japan, we have conducted extensive rearing of leaf-mining larvae on diverse plants and a substantial collection of mined leaves. From the accumulated materials, we identified two undescribed trachyine species. The two new species are associated with two new plant orders and families for Tracheini: Oxalidales (Elaeocarpaceae) and Santalales (Loranthaceae). Furthermore, we detected leaf mines for 31 trachyine species, including new leaf mine records for 18 trachyine species. In this paper, we describe the two new species, as well as the leaf mines of 31 trachyine species, and discuss the diversity and evolution of plant utilization patterns of trachyine species in the Japanese Archipelago.

Materials and methods

We have conducted extensive sampling of buprestid leaf mines from the Japanese Archipelago since the 1980s. By rearing the leaf-mining larvae, we obtained 400 adult buprestid beetles. All of the specimens were collected by MK unless otherwise noted. The leaves containing leaf mines were dried, and the dried herbarium specimens have been deposited in the Kyoto University Museum (**KUM**).

The morphology of adult specimens was examined under a microscope (VHS-7000; Keyence). Specimens were photographed by synthesizing virtual images from

a sequence of corresponding depth images. To observe male genitalia, the specimens were macerated in hot water and dissected under a microscope. The abdomen was removed from the body and then cleaned in 5% KOH solution for ~ 12 h at room temperature. After washing in distilled water, the terminalia extracted from the abdomen were mounted on slides with glycerol.

Results

Systematics of Japanese *Habroloma* Thomson, 1864

Among adult beetles that emerged from collected leaf mines, we identified two new *Habroloma* species. We describe the two species using the following key to Japanese species. In this key, *Habroloma hikosanensis* is missing because it is within the morphological variation of *Habroloma yuasai*.

Key to the Japanese *Habroloma* Thomson, 1864 species

1 Pronotum with a large distinct fovea at the post-inferior side of each anterior angle ..... ***bifrons* (Kiesenwetter, 1879)**

– Pronotum with a shallow depression at the post-inferior side of each anterior angle **2**

2 Ventral surface of body flattened; thickness index (body thickness/body length) less than 0.36 (Fig. 2A–D); prosternal process inverted trapezoid, posterior margin linearly truncated (Fig. 3A–D) **3**

– Ventral surface of body convex ventrally; thickness index (body thickness/body length) greater than 0.37; prosternal process round or lingulate, longer than wide, posterior margin often rounded (Fig. 3E–J) **6**

3 Elytra clothed with greyish golden hairs except silvery vitta (Fig. 1A, B) **4**

– Elytra clothed with greyish hairs except silvery vitta (Fig. 1C, D) **5**

4 Elytra with a distinct V-shaped silvery vitta (Fig. 1B) ..... ***eximium* (Lewis, 1892) [host: *Symplocos*]**

– Elytra without a distinct V-shaped silvery vitta (Fig. 1A) ..... ***liukiuensis* Obenberger, 1940 [host: *Symplocos*]**

5 Elytra with a V-shaped silvery vitta, which neighboring a V-shaped black vitta ahead (Fig. 1C); prosternal process slightly expanded posteriorly (Fig. 3C) ... ***griseonigra* (E. Saunders, 1873) [host: *Quercus*]**

– Elytra with two waving transverse silvery vittae on posterior half; anterior vitta M-shaped (Fig. 1D); prosternal process strongly expanded posteriorly (Fig. 3D) ..... ***elaeocarpusi* Kato, sp. nov. [host: *Elaeocarpus*]**

6 Basal 2/3 of elytra with a steel-blue patch (Fig. 1E) ..... ***lewisii* (E. Saunders, 1873) [host: *Rosa*].**

– Elytra without steel-blue patch 7

7 Elytra with three wavy silvery and golden transverse vittae on posterior 2/3 (Fig. 1F); prosternal process round (Fig. 3F) ..... ***taxillusi* Kato, sp. nov. [host: *Taxillus*]**

– Elytra with two wavy silvery or golden transverse vittae on posterior half (Fig. 1G–K); prosternal process lingulate, longer than wide (Fig. 3G–J) **8**

8 Body subovate, less attenuated posteriorly, margins nearly parallel in basal half (Fig. 1G); prosternal process narrowest at base, with rounded posterior margin (Fig. 3G)..... ***nixilla*** (Obenberger, 1929) **[host: *Lagerstroemia*]**

– Body cuneiform, attenuating toward posterior end even from basal half (Fig. 1H–K); prosternal process with linearly truncated posterior margin (Fig. 3H–J) **9**

9 Anterior wavy transverse silverly/golden band of posterior elytra complete (Fig. 1H, I); prosternal process with posterior margin linearly truncated (Fig. 3H, I) **10**

– Anterior wavy transverse silverly/golden band of posterior elytra disconnected midway (Fig. 1J, K); prosternal process with posterior margin arched (Fig. 3J) **12**

10 Anterior wavy transverse band silvery (Fig. 1I) ..... ***marginicolle* (Fairmaire, 1888) [host: *Rubus*]**

– Anterior wavy transverse band grayish-golden and partly silvery (Fig. 1H)... **11**

11 Elytra with the sides constricted behind humeri; prosternal process as long as wide..... ***asahinai* Y. Kurosawa, 1959 [host: *Rubus*]**

– Elytra with the sides not constricted behind humeri (Fig. 1H); prosternal process longer than wide (Fig. 3H) ..... ***yuasai* Y. Kurosawa, 1976 [host: *Platycarya*]**

12 Elytra strongly attenuate from base to the apex, with the sides less arcuate and distinctly constricted behind humeri (Fig. 1J) ..... ***subbicorne* (Motschulsky, 1860) [host: *Rubus*]**

– Elytra attenuate from the base to the apex, with the sides not constricted behind humeri (Fig. 1K)..... ***atronitidum* (Gebhardt, 1929) [host: *Rubus*]**

***Habroloma elaeocarpusi* sp. nov.**

https://zoobank.org/13395C99-4CB0-48AB-8BAA-5BA2C4799DEF

Figs 1D, 2D, 3D, K–M

Material examined. ***Holotype*:** Japan: ♂ (MK-BP-a327), Mt. Osuzu, Tsuno-cho, Miyazaki Pref. (32.262°N, 131.471°E, 230 m above sea level), 14-VII-2021 (as larva on *Elaeocarpus japonicus*), emerged on 27-VII-2021, NSMT-I-C-200265.

***Paratypes*:** Japan: 1♂(MK-BP-a360), same data as holotype, emerged on 30-VII-2021, NSMT-I-C-200266; 1♀ (MK-BP-k35), Isso, Yakushima-cho, Yaku Island (30.440°N, 130.472°E, 60 m above sea level), 11-VI-1993 (as larva on *Elaeocarpus japonicus*), emerged on 26-VI-1993, NSMT-I-C-200267.

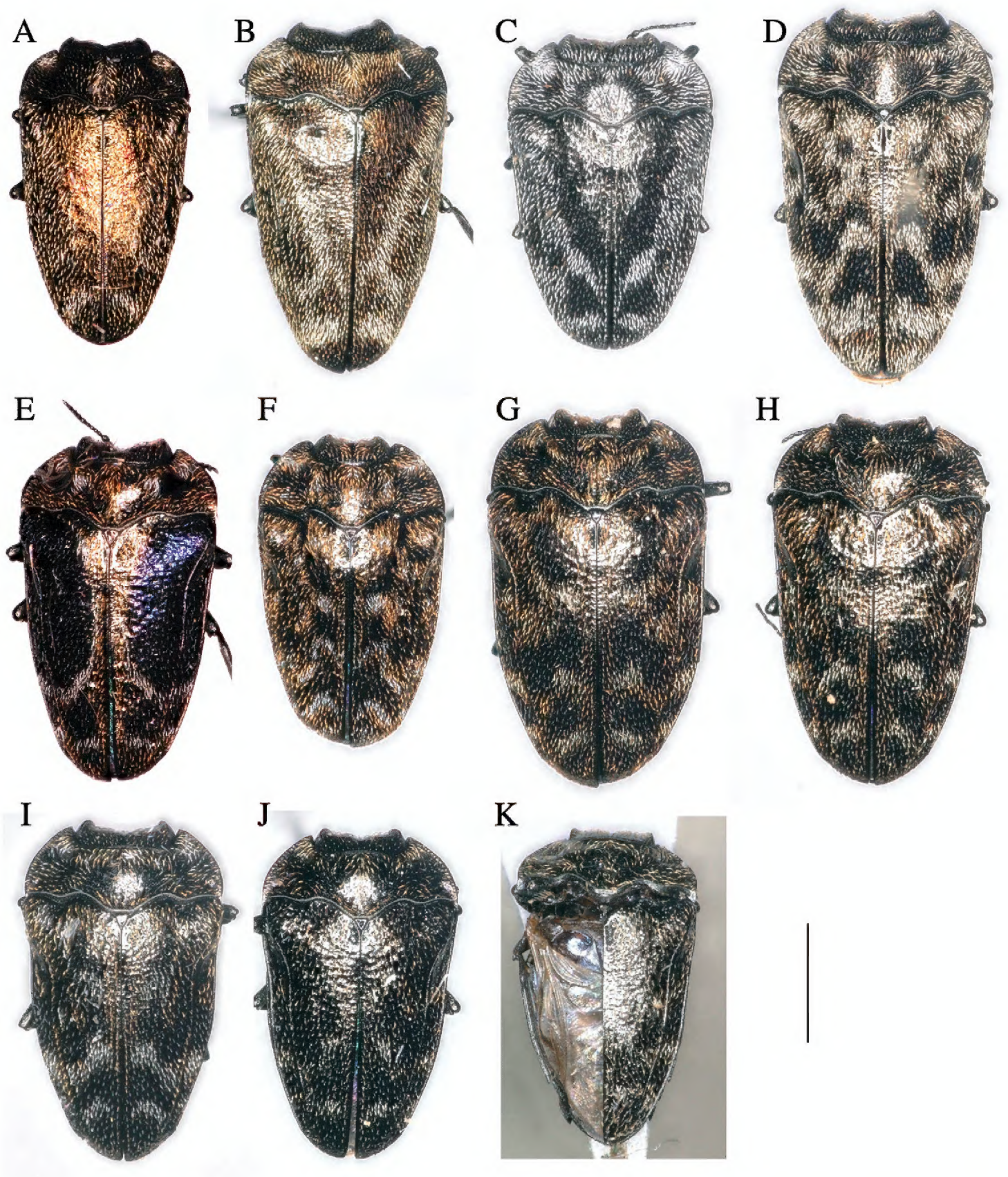

Figure 1. *Habroloma* species of Japan, adult dorsal views **A** *H. liukiuense* **B** *H. eximium eupoetum* **C** *H. griseonigrum* **D** *H. elaeocarpusi* **E** *H. lewisii* **F** *H. taxillusi* **G** *H. nixilla insulicola* **H** *H. yuasai* **I** *H. marginicolle* **J** *H. subbicorne* **K** *H. atronitidum*. Scale bar: 1 mm.

Other material. Japan: 2♂2♀, same data as holotype, emerged on 27-VII–2-VI-II-2021.

Diagnosis. A small wedge-shaped species (length 3.1–3.3 mm) having pronotum with posterior margin trisinuate. Elytra rather flattened, ornamentation consisting of white pubescence; on posterior half with three transverse bands, anterior one obliquely

zigzag, two posterior ones transversely straight. Male genitalia with slender tegmen with paramere setiferous on anterior margin and slender pennis with rounded apex. Larvae mine leaves of *Elaeocarpus japonicus*.

Description. Adult male: (Figs 1D, 2D, 3D) ***Body*** somewhat wedge-shaped and attenuated posteriorly; above entirely black-aeneous; body beneath, legs, and antennae black, with a very slight aeneous tinge, except tarsal lamellae brownish.

Head, seen from above, transverse, broadly and sharply excavated between the eyes, with the inferior rim of the eyes strongly and rather suddenly produced; frons with the median impression distinct; fovea just above each antennal cavity obsolete and indistinct; surface rather smooth, sparsely scattering laterally with traces of variolate and ocellate punctures, and sparsely clothed with whitish recumbent hairs; clypeal suture transverse, somewhat arcuate exteriorly; clypeus transverse, ~ 2.6× as wide as long, with the anterior margin somewhat arcuately emarginate; antennal cavities surrounded posteriorly with elevated carina; antennae short and compact, with the third segment ~ 1.5× as long as the fourth, with apical five segments serrated.

Pronotum transverse, widest just before the base, distinctly wider than elytra, and ~ 3.2× as wide as long; sides slightly but distinctly expanded just before the base, then crescent-shaped and strongly attenuated to the anterior angles, which are acute and strongly produced in dorsal aspect; anterior margin deeply, broadly and arcuately emarginate; posterior margin trisinuate, produced and subtruncate, narrowly and slightly emarginate just before scutellum; posterior angles acute and produced posteriorly; disk dilated laterally, broadly and obsoletely depressed at the anterior half of the lateral dilation on each side, but without fovea, and obsoletely impressed along the basal lobe causing the middle of the disk to be somewhat convex; surface lustrous, punctured with traces of large, obsolete, shallow, somewhat ocellate punctures, and sparsely clothed with whitish hairs. Scutellum smooth and triangular.

Elytra rather deplanate, widest at the base, ~ 1.3× as long as wide and ~ 4.3× as long as pronotum; sides feebly sinuate and narrowed or subparallel to the anterior 2/5, and then arcuately attenuated to the apex, but the attenuation somewhat angulate near the apex; sutural margin not elevated entirely; humeri slightly prominent; basal depressions along the base transverse; lateral carinae subparallel to the lateral margin; disk constricted behind humeri, narrowly and obsoletely impressed along the inferior side of each lateral carina; surface rather uniformly but coarsely punctate with shallow, ill-defined, irregularly sized punctures, with the punctuation being somewhat rugous at the sides; ornamentation consisting of white, yellowish-grey, and blackish hairs, with the whitish hairs being predominant. Ornamentation consisting of white pubescence arranged on each elytron as follows: at base with two irregular spots, at mid length near suture with one irregular spot, toward side with one narrow, wavy, and irregular strip, on posterior half with three transverse bands, anterior one obliquely zigzag, two posterior ones transversely straight.

Body beneath scattered with very fine inconspicuous cinereous hairs. Prosternal process inverted trapezoidal, narrow toward the base, ~ 1.3× broader than long, with the apex almost truncate. Metasternum slightly convex coarsely punctate with variolate

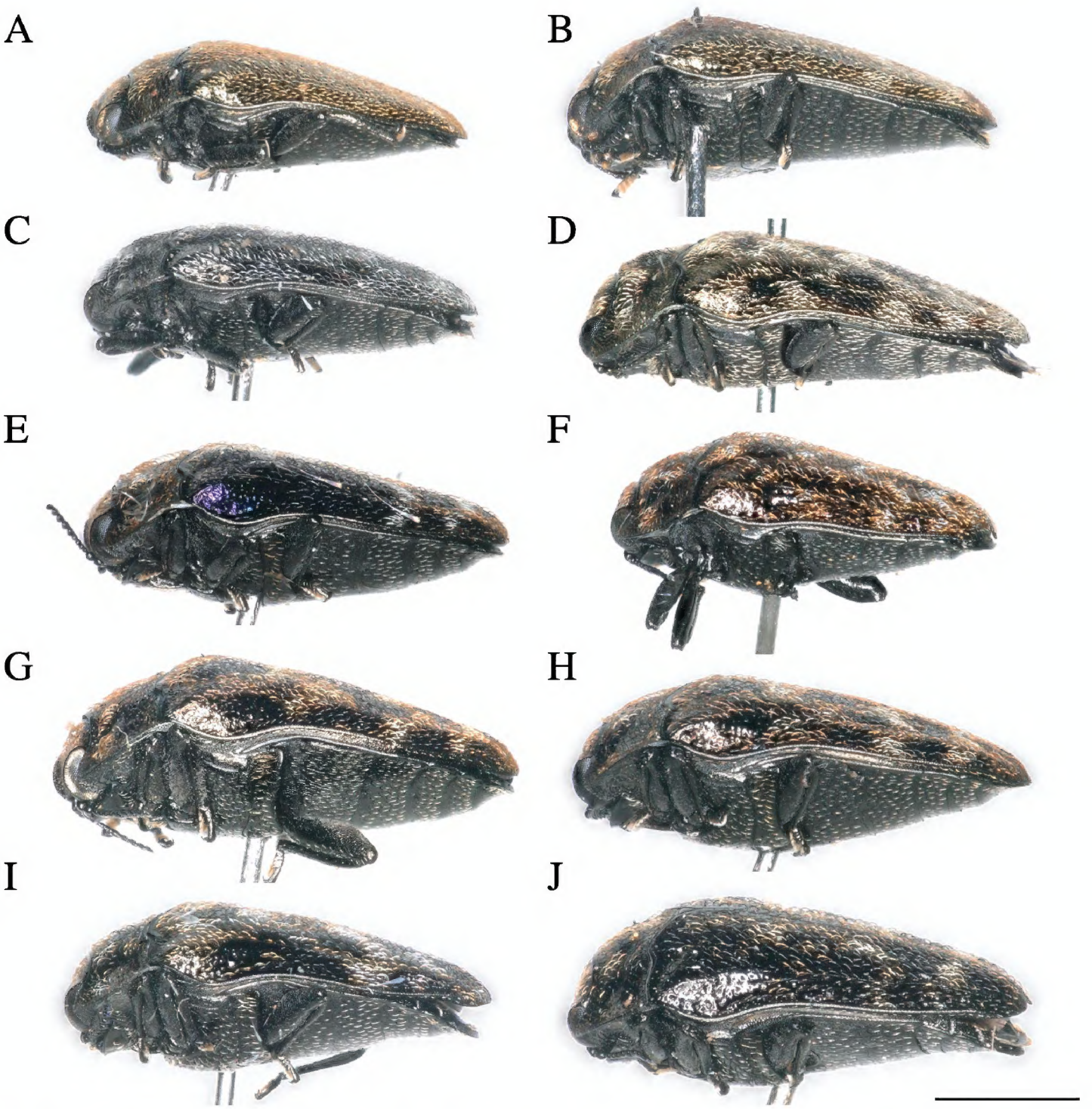

Figure 2. *Habroloma* species of Japan, adult lateral views **A** *H. liukiuense* **B** *H. eximium eupoetum* **C** *H. griseonigrum* **D** *H. elaeocarpusi* **E** *H. lewisii* **F** *H. taxillusi* **G** *H. nixilla insulicola* **H** *H. yuasai* **I** *H. marginicolle* **J** *H. subbicorne*. Scale bar: 1 mm.

and obsolete punctures at the middle. Abdomen beneath rather uniformly punctate with shallow, obsolete variolate punctures. Legs normal; posterior coxae depressed entirely, with the latero-posterior angles acute and produced latero-posteriorly.

Male genitalia (Fig. 3K–M). Sternite VIII wide, roundly arcuated along anterior margin, furnished with several setae on each side of anterior margin. Tegmen slender; paramere setiferous on anterior margin; phallobase wide, ~ 1/5 length of tegmen. Penis slender, slightly shorter than tegmen; round at apex, basally with median struts ~ 1/3 length of penis.

Female. Like the male, but more robust. Length: 3.1–3.3 mm, width: 1.8–1.9 mm.

Etymology. The name indicates the host plant genus, *Elaeocarpus*.

Japanese name. Kobanmochi-hiratachibi-tamamushi.
Host plant. *Elaeocarpus japonicus* Sieb. et Zucc.
Habitat. Primary evergreen forests dominated by *Castanopsis sieboldii* subsp. *sieboldii*.
Distribution. Japan (Kyushu and Yaku Island).

Habroloma taxillusi sp. nov.

https://zoobank.org/3A0F84C8-254D-4F21-AD10-90501E54DB37
Figs 1F, 2F, 3F

Material examined. ***Holotype*:** Japan: ♂ (MK-BP-k40), Yakukachi, Amami-shi, Kagoshima Pref. (28.228°N, 129.347°E, 40 m above sea level), 23-V-2009 (as larva on *Taxillus yadoriki* collected by A. Kawakita), emerged on 7-VI-2009, NSMT-I-C-200268.

***Paratype*:** Japan: 1♀(MK-BP-k39), same data as holotype, emerged on 2-VI-2009, N NSMT-I-C-200269.

Diagnosis. A small wedge-shaped species (length 2.5–2.7 mm) having pronotum with posterior margin trisinuate. Elytra slightly convex around base, ornamentation consisting of yellowish-grey pubescence; on posterior 2/3 with three transverse bands, first two obliquely zigzag, apical one slightly transversely waved. Larvae mine leaves of a mistletoe species, *Taxillus yadoriki*.

Description. Adult male: (Figs 1F, 2F, 3F) ***Body*** somewhat wedge-shaped and attenuated posteriorly; above entirely black-aeneous; body beneath, legs, and antennae black, with a very slight aeneous tinge, except tarsal lamellae dark brownish.

Head, seen from above, transverse, broadly excavated between the eyes, with the inferior rim of the eyes strongly produced; frons with the median impression distinct; fovea just above each antennal cavity obsolete and indistinct; surface rather smooth, sparsely scattered laterally with traces of variolate and ocellate punctures, and sparsely clothed with recumbent yellowish-grey hairs; clypeal suture transverse, somewhat arcuate exteriorly; clypeus transverse, ~ 2.6× as wide as long, with the anterior margin somewhat arcuately emarginate; antennal cavities surrounded posteriorly with elevated carina; antennae short and compact, with the third segment ~ 1.5× as long as the fourth, and five apical serrated segments.

Pronotum transverse, widest just before the base, as wide as elytra, and ~ 2.4× as wide as long; sides slightly but distinctly expanded just before the base, then crescent-shaped and strongly attenuated to the anterior angles, which are acute and strongly produced in dorsal aspect; anterior margin deeply, broadly, and arcuately emarginate; posterior margin trisinuate and subtruncate, narrowly and slightly emarginate just before scutellum; posterior angles acute and produced posteriorly; disk dilated laterally, broadly and obsoletely depressed at the anterior half of the lateral dilation on each side, but without fovea, and obsoletely impressed along the basal lobe causing the middle of the disk to be somewhat convex; surface lustrous, punctured the traces of large, obsolete, shallow, somewhat ocellate structures, and sparsely clothed with yellowish gray hairs. Scutellum smooth and triangular.

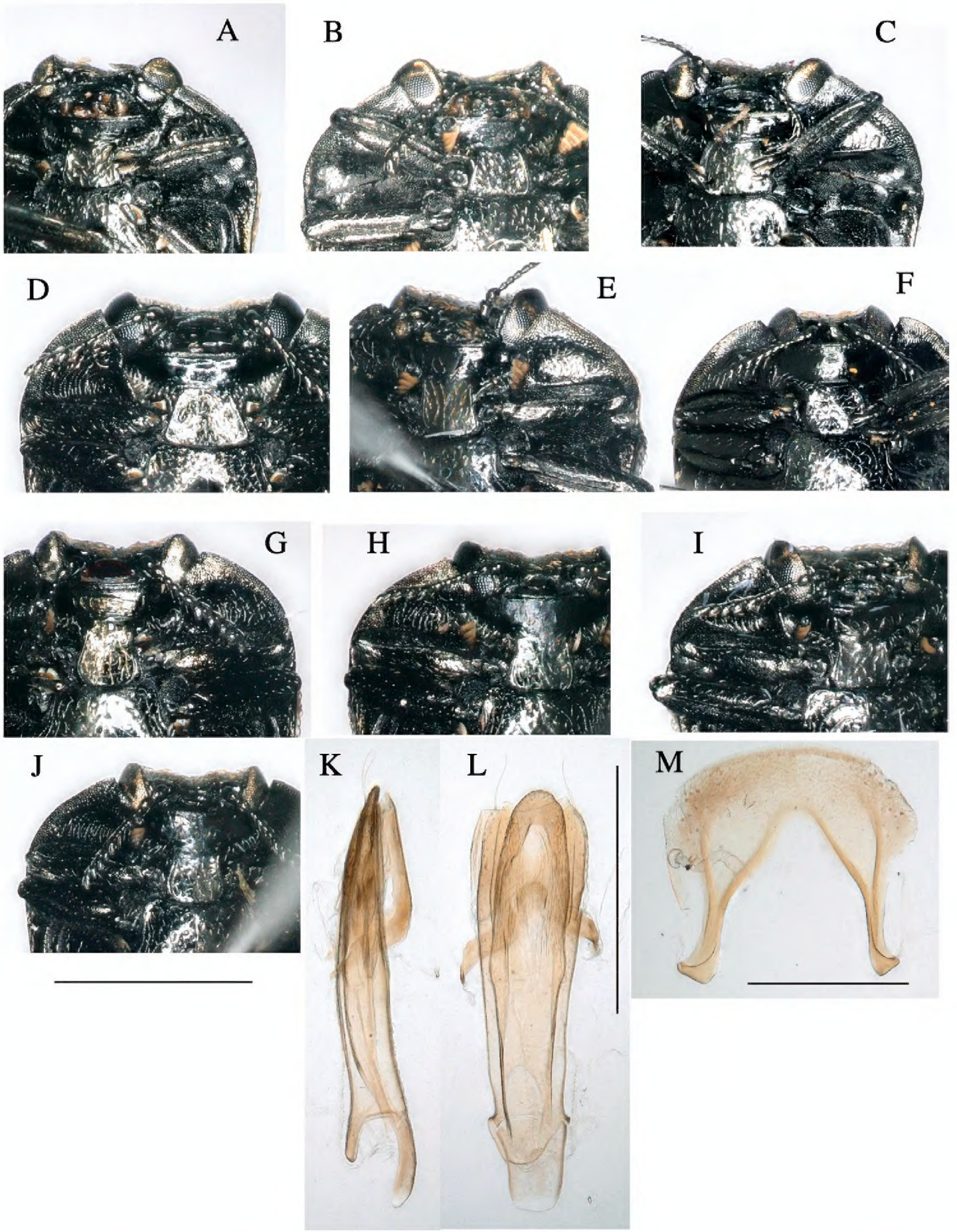

Figure 3. *Habroloma* species of Japan, adult ventral views (**A–J**) and male genitalia of *H. elaeocarpusi* (**K–M**). **A** *H. liukiuense* **B** *H. eximium eupoetum* **C** *H. griseonigrum* **D** *H. elaeocarpusi* **E** *H. lewisii* **F** *H. taxillusi* **G** *H. nixilla insulicola* **H** *H. yuasai* **I** *H. marginicolle* **J** *H. subbicorne* **K, L** lateral and ventral views of tegmen, pennis and sternite IX **M** tergite VIII. Scale bars 1 mm (**A–J**); 0.5 mm (**K–M**).

Elytra slightly convex along base, widest at the base, ~ 1.4× as long as wide and ~ 3.3× as long as pronotum; sides feebly sinuate and narrowed or subparallel to the anterior 2/5, and then arcuately attenuated to the apex but with the attenuation somewhat an-

gulate near the apex; humeri slightly prominent; basal depressions along the base transverse; lateral carinae subparallel to the lateral margin; disk constricted behind humeri, narrowly and obsoletely impressed along the inferior side of each lateral carina; surface rather uniformly but coarsely punctate with shallow, ill-defined, irregularly sized punctures, but the punctuation somewhat rugous at the sides. Ornamentation consisting of yellowish grey pubescence arranged on each elytron as follows: at base with two irregular spots, on posterior 2/3 with three transverse bands, first and second ones obliquely zigzag, apical one slightly transversely waved; with transverse irregular spot apically.

Body beneath scattered with very fine inconspicuous cinereous hairs. Prosternal process rounded, ~ 1.27× broader than long. Metasternum slightly convex and coarsely punctate, with variolate and obsolete punctures at the middle. Abdomen beneath rather uniformly punctate with shallow, obsolete variolate punctures. Legs normal; posterior coxae depressed entirely, with the latero-posterior angles acute and produced latero-posteriorly.

***Male genitalia*:** not studied.

Female. Like the male, but more robust. Ornamentation of elytra is similar but pubescence more whitish in female. Body length: 2.5–2.7 mm, width: 1.5–1.7 mm.

Etymology. The specific name indicates host plant genus, *Taxillus*.

Japanese name. Obayadorigi-hiratachibi-tamamushi.

Host plant. *Taxillus yadoriki* (Maxim.) Danser [Loranthaceae]

Habitat. Canopy of primary evergreen forests dominated by *Castanopsis sieboldii* subsp. *lutchuensis* (Fig. 5L).

Distribution. Japan (Amami-Oshima Island, known only from the type locality).

Leaf mines of Japanese Tracheini species

Leaf mines of Tracheini species have the following characteristics. The mined leaves are mature leaves that have completed expansion and hardening. An egg is laid on the upper side of a leaf and covered by a circular brown glossy coating, which is secreted by an adult female. Pupation takes place within the mine. Hereafter, we describe leaf mines of the 14 *Habroloma* and 20 *Trachys* species in Japan.

Habroloma species checklist

1. *Habroloma subbicorne* (Motschulsky, 1860)

Fig. 4A–E

Host plant. Rosaceae: *Rubus parvifolius* (Yano 1952), *Rubus palmatus*, *Rubus buergeri* (Kurosawa 1959).

Leaf mine. Brown full-depth blotch mine on mature leaf. Egg is laid at a distance from leaf margin and the mine expands in the leaf blade. Frass is thread-like.

Material examined. Nishihoragawa, Kiso, Nagano Pref. 6-VIII-2015 (as larva on *Rubus palmatus* var. *coptophyllus*), emerged on 27-VIII-2015 (Fig. 4A); Sakai-gawa, Takaoka, Miyazaki, Miyazaki Pref., 21-IX-2020 (as larva on *R. buergeri*), emerged on 7-VII-

2020 (Fig. 4B, C); Seikandoro, Kumanogawa, Shingu, Wakayama Pref., 14-VII-2021 (as larva on *R. buergeri*), emerged on 31-VII-2021 (Fig. 4D); Furubokke, Kasai, Hyogo Pref., 11-IX-2018 (as pupa on *R. parvifolius parvifolius*), emerged on 15-IX-2018 (Fig. 4E).

2. *H. atronitidum* (Gebhardt, 1929)
Fig. 4F

Host plant. Rosaceae: *Rubus vernus* (new record).

Leaf mine. Brown full-depth blotch mine on mature leaf. Egg is laid near leaf margin, and the mine expands along the leaf margin. Frass is thread-like.

Material examined. Mumyo-dani, Niimi, Okayama Pref., 9-VII-1991 (as pupa on *Rubus vernus*), emerged on ?-VIII-1991 (Fig. 4F).

3. *H. marginicolle* (Fairmaire, 1888)
Fig. 4G–I

Host plant. Rosaceae: *Rubus sieboldii* (Kurosawa 1959), *Rubus buergeri* (new record).

Leaf mine. Brown blotch mine on mature leaf. Egg is laid at a distance from leaf margin, and the mine expands in the leaf blade. Frass is thread-like.

Material examined. Modo, Minamata, Kumamoto Pref., 26-V-2018 (vacant mine of *Rubus sieboldii*) (Fig. 4G); Inohae, Kitago, Nichinan, Miyazaki Pref., 16-VI-2019 (as larva on *Rubus sieboldii*), emerged on 19-VII-2019; Inohae, Kitago, Nichinan, Miyazaki Pref., 16-VI-2019 (as larva on *R. buergeri*), emerged on 21-VII-2019 (Fig. 4H, I).

4. *H. asahinai* Y. Kurosawa, 1959
Fig. 4J

Host plant. Rosaceae: *Rubus sieboldii* (Ohmomo and Fukutomi 2013).

Leaf mine. Brown full-depth blotch mine on mature leaf. Egg is laid near leaf margin, and the mine expands along the leaf margin. Frass is thread-like.

Material examined. Okuma, Kunigami, Okinawa Pref., 30-III-2018 (vacant mine of *Rubus sieboldii*) (Fig. 4J).

5. *H. lewisii* (E. Saunders, 1873)
Fig. 4K–M

Host plant. Rosaceae: *Rosa multiflora* (Yano 1952).

Leaf mine. Brown, full-depth sometimes bluish, linear-blotch mine on mature leaf. Egg is laid along leaf margin, and the mine expands along leaf margin. Frass is thread-like, coiling or undulating for an extended length.

Material examined. Sabushi-gawa, Niimi, Okayama Pref., 1-VII-2018 (as larva on *Rosa multiflora*), emerged on 18-VII-2018 (Fig. 7K); Shimotokuyama, Hiruzen, Maniwa, Okayama Pref., 1-VII-2018 (as larva on *Rosa multiflora*) (Fig. 4L, M).

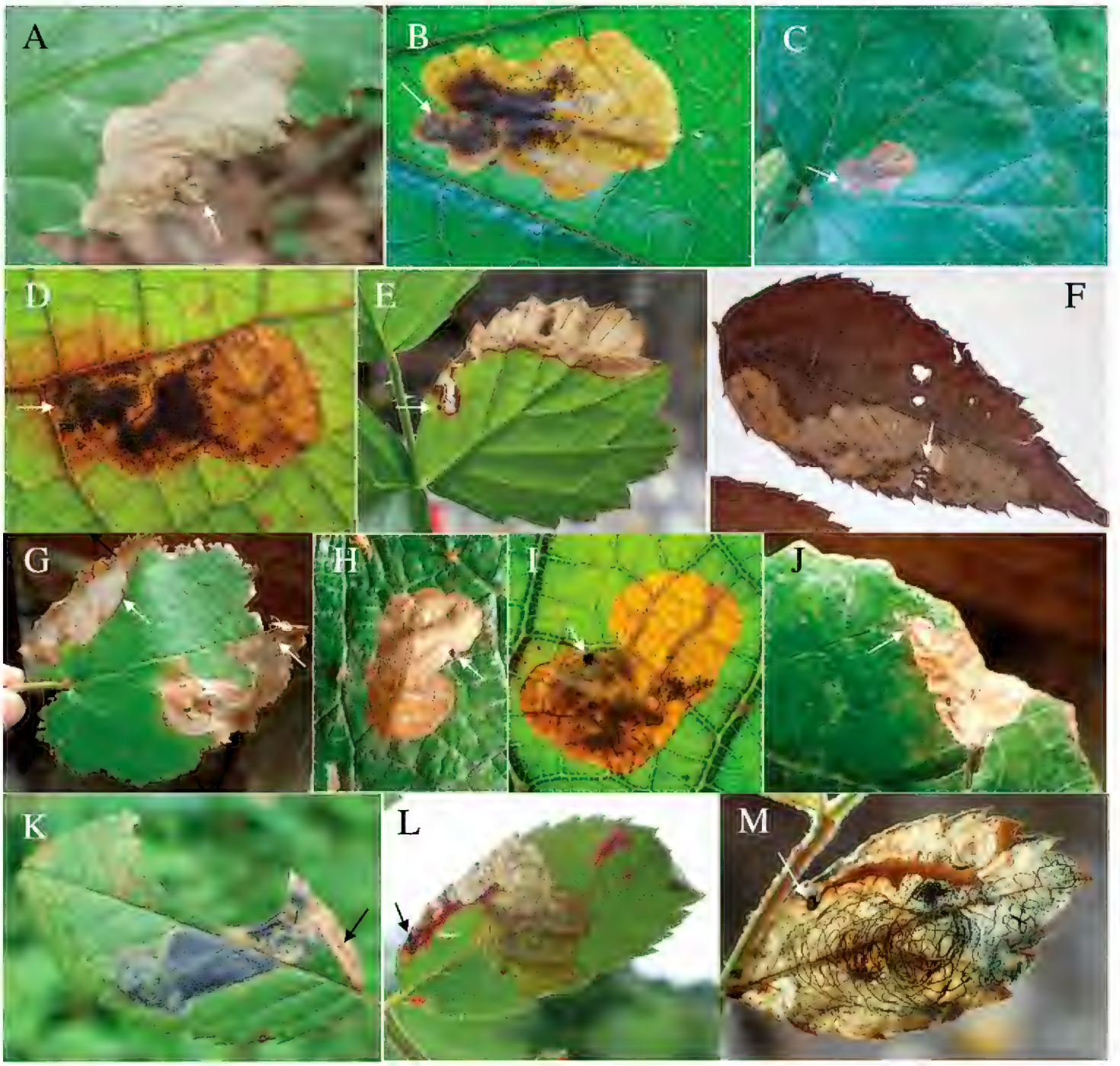

Figure 4. Leaf mines of *Habroloma* spp. on leaves of Rosaceae **A–E** *H. subbicorne* on *Rubus palmatus* var. *coptophyllus* (**A**), *Rubus buergeri* (**B–D**), and *Rubus parvifolius* (**E**) **F** *H. atronitidum* on *Rubus vernus* **G–I** *H. marginicolle* on *Rubus sieboldii* **J** *H. asahinai* on *Rubus sieboldii* **K–M** *H. lewisii* on *Rosa multiflora.* Arrows indicate oviposition scars.

6. *H. griseonigrum* (E. Saunders, 1873)

Fig. 5A

Host plant. Fagaceae: *Quercus glauca*, *Q. acutissima*, *Q. serrata* (Yano 1952), *Quercus acuta* (Ohmomo and Fukutomi 2013), *Quercus hondae* (new record).

Leaf mine. Brown full-depth blotch mine on mature leaf. Egg is laid near leaf margin of leaf base, and the mine expands upwards along leaf margin. Frass is thread-like.

Material examined. Gion, Yayoi, Saeki, Ooita Pref., 14-VI-1998 (as larva on *Quercus hondae*); emerged on 8-VII-1998 (Fig. 5A).

7. *H. yuasai* Y. Kurosawa, 1976
Fig. 5B–D

Host plant. Juglandaceae: *Platycarya strobilacea* (Yano 1952).

Leaf mine. Brown full-depth linear-blotch mine on mature leaf. Egg is laid near leaf margin, and the mine expands along leaf margin. Frass is thread-like, excreted from the mine through cracks of upper epidermis.

Material examined. Makido, Niimi, Okayama Pref., 22-VI-2020 (as larva on *Platycarya strobilacea*), emerged on 20-VII-2020 (Fig. 5B–D).

8. *H. elaeocarpusi* sp. nov
Fig. 5E–G

Host plant. Elaeocarpaceae: *Elaeocarpus japonicus* (new record).

Leaf mine. Pale brown full-depth linear-blotch mine on mature leaf. Egg is laid just beside midrib of leaf base, and the mine expands along midrib or along leaf margin. Frass is thread-like; frass line iterating arc-shaped reciprocating motion.

Material examined. Mt. Osuzu, Tsuno-cho, Miyazaki Pref., 14-VII-2021 (as larva on *Elaeocarepus japonicus*), emerged on 27-VII-2021 (Fig. 5E–G).

9. *H. bifrons* (Kiesenwetter, 1879)

Host plant. Unknown, while related species in Europe is associated with *Geranium* (Geraniaceae).

Leaf mine. Unknown.

10. *H. nixilla insulicola* Y. Kurosawa, 1959
Fig. 5H, I

Host plant. Lythraceae: *Lagerstroemia subcostata* (Kurosawa 1959).

Leaf mine. Brown full-depth linear-blotch mine on mature leaf. Egg is laid along leaf margin of leaf base, and the mine expands along leaf margin. Frass is thread-like, coiling in the mine.

Material examined. Sumiyo, Amami, Kagoshima Pref., 23-V-2009 (as larva on *Lagerstroemia subcostata*), emerged on 6-VI-2009 (Fig. 8H, I).

11. *H. taxillusi* sp. nov.
Fig. 5J–L

Host plant. Loranthaceae: *Taxillus yadoriki* (new record).

Leaf mine. Brown full-depth linear-blotch mine on mature leaf. Egg is laid along leaf margin of leaf base, and the mine expands along leaf margin. Frass is granular, accumulated in the center of the mine.

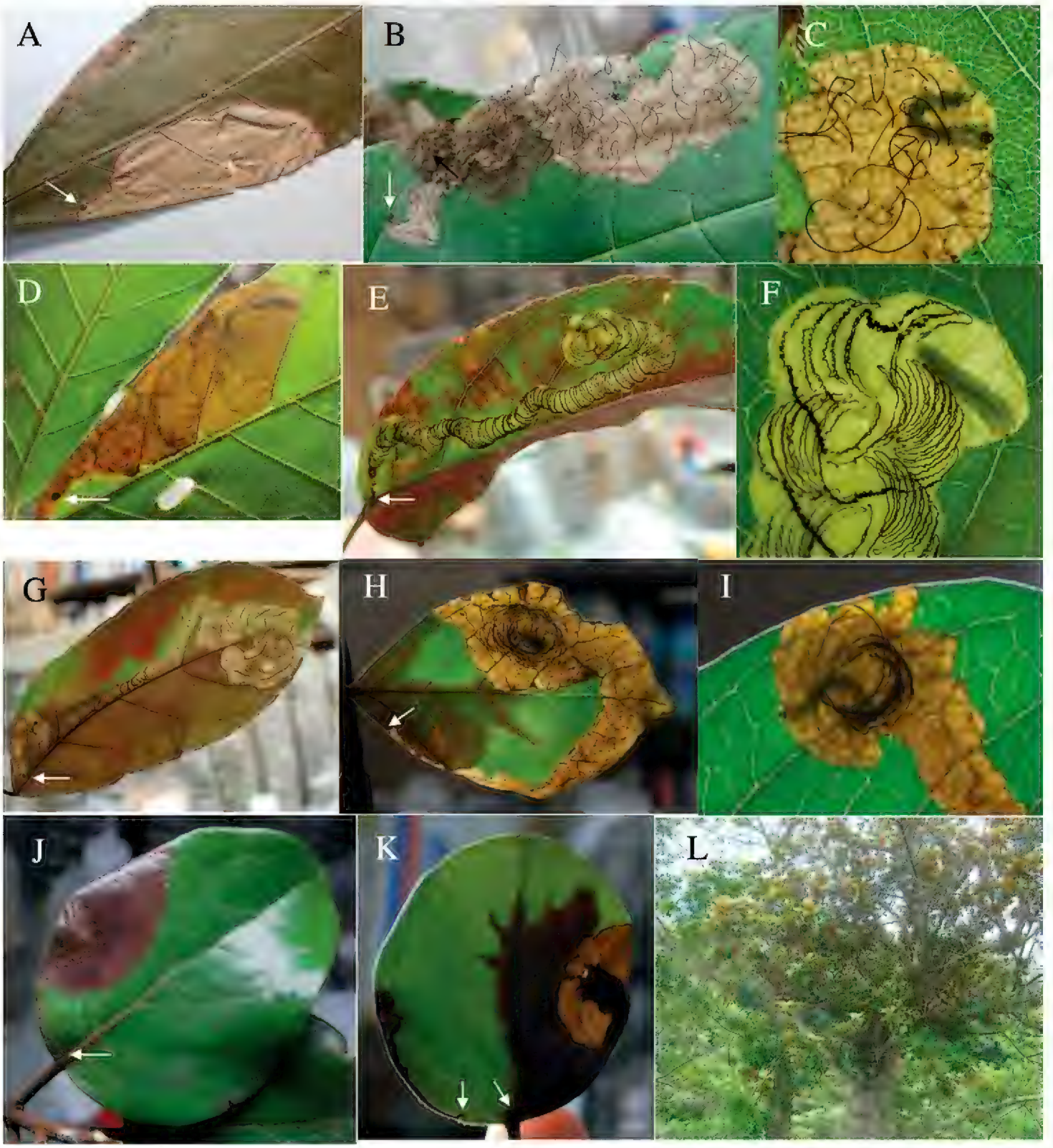

Figure 5. Leaf mines of *Habroloma* spp. on leaves of Fagaceae, Juglandaceae, Elaeocarpaceae, Lythraceae, and Loranthaceae **A** *H. griseonigrum* on *Quercus hondae* **B–D** *H. yuasai* on *Platycarya strobilacea* **E–G** *H. elaeocarpusi* on *Elaeocarpus japonicus* **H, I** *H. nixilla* on *Lagerstroemia subcostata* **J–L** *H. taxillusi* on *Taxillus yadoriki*. Arrows indicate oviposition scars.

Material examined. Yakukachi, Amami-shi, Kagoshima Pref., 23-V-2009 (as larva on *Taxillus yadoriki*), emerged on 7-VI-2009 (Fig. 5J–L).

12a. *H. eximium eximium* (Lewis, 1893)

Host plant. Symplocaceae: *Symplocos lancifolia* (Kurosawa 1959).

Leaf mine. Unknown.

12b. *H. eximium eupoetum* (Obenberger, 1929)
Fig. 6A–C

Host plant. Symplocaceae: *Symplocos prunifolia* (Kurosawa 1976), while the identification seems to be incorrect; *S. caudata* (new record).

Leaf mine. Pale brown full-depth linear-blotch mine on mature leaf. Egg is laid near midrib of leaf base, and the hatched larva enters midrib and bores into petiole, causing the leaf to fall off from the branch by being abscised at the petiole base. After the leaf-fall, the mine departs from the midrib and slowly expands upwards along leaf margin or along midrib. After advancing halfway, the mine abruptly expands to become a blotch mine. Frass is thread-like, going in a zigzag in the early linear mine, and becomes thick cord-like without undulating as the mine expands. The fallen leaf is kept green for ca. two weeks, during which the larva completes its development.

Material examined. Komi, Iriomote Is., Yaeyama, Okinawa Pref., 10-V-2020 (as larva on *Symplocos caudata*), emerged on 15-VI-2020 (Fig. 6A–C).

13. *H. liukiuense* (Obenberger, 1940)
Fig. 6D–I

Host plant. Symplocaceae: *Symplocos okinawensis* (Ohmomo and Fukutomi 2013), *S. microcalyx* (Ohmomo and Fukutomi 2013).

Leaf mine. Pale brown full-depth linear-blotch mine on mature leaf. Egg is laid near midrib of leaf base, and the hatched larva enters midrib and bores into petiole, causing the leaf to fall off from the branch by being abscised at the petiole base. After the leaf-fall, the mine departs from the midrib and slowly expands upwards along leaf margin or along midrib. After advancing halfway, the mine abruptly expands to become a blotch mine. Frass is thread-like, going in a zigzag in the early linear mine, and becomes granular. The fallen leaf is kept green for ca. two weeks, during which the larva completes its development.

Material examined. Foothill of Mt. Yonaha, Kunigami, Okinawa Pref., 6-VI-2018 (as larva on *Symplocos microcalyx*), emerged on 12-VII-2018 (Fig. 6D–I).

14. *H. hikosanense* Y. Kurosawa, 1959

Host plant. Unknown.

Leaf mine. Unknown.

Trachys species checklist

1. *Trachys auricollis* E. Saunders, 1873
Fig. 7A

Host plant. Fabaceae: *Pueraria montana* var. *lobata* (Yano 1952).

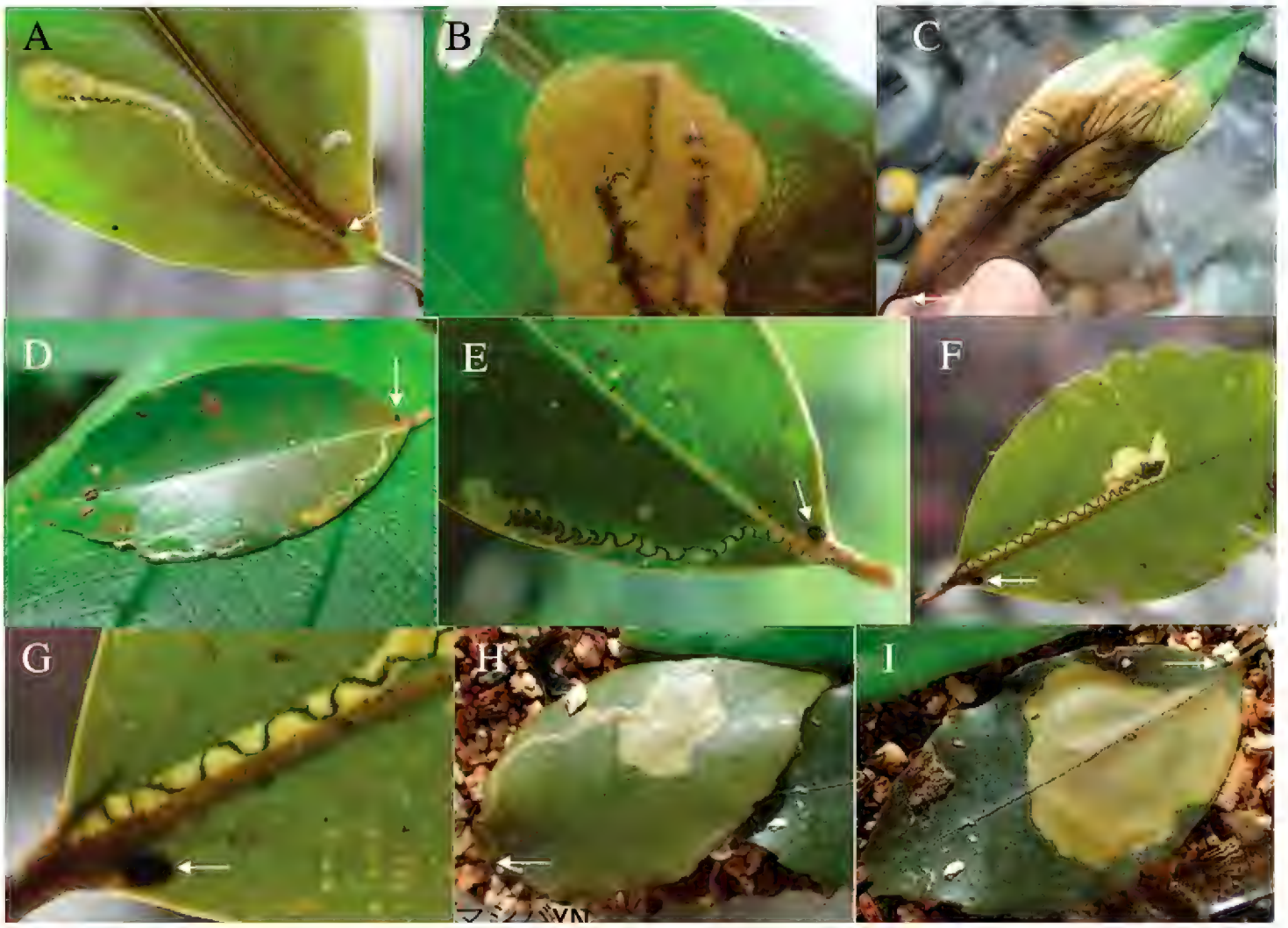

Figure 6. Leaf mines of *Habroloma* spp. on leaves of Symplocaceae **A–C** *H. eximium* on *Symplocos caudata* **D–I** *H. liukiuense* on *Symplocos microcalyx*. Arrows indicate oviposition scars.

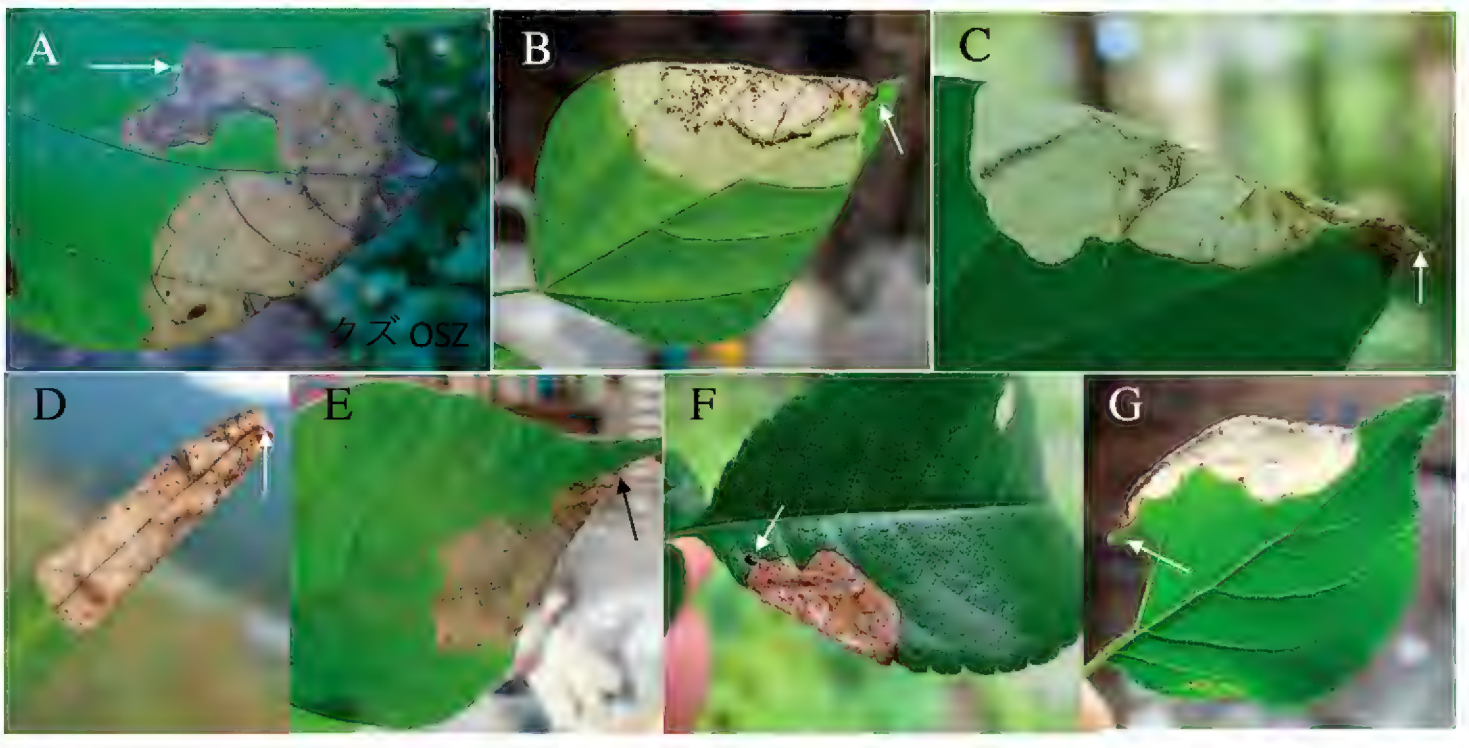

Figure 7. Leaf-mines of *Trachys* spp. on leaves of Fabaceae and Rosaceae **A** *T. auricollis* on *Pueraria montana* var. *lobata* **B–D** *T. reitteri* on *Amphicarpaea edgeworthii* (**B, C**) and *Glycine soja* (**D**) **E** *T. tokyoensis* on *Desmodium podocarpum* subsp. *fallax* **F** *T. toringoi* on *Chaenomeles japonica* **G** *T. inconspicuus* on *Prunus mume*. Arrows indicate oviposition scars.

Leaf mine. Gray full-depth blotch mine on mature leaflet. Egg is laid in an inner area of leaf blade, and mine expands toward leaf margin. Frass is granular and distributed all over the mine.

Material examined. Mt. Osuzu, Tsuno, Miyazaki Pref., 14-VII-2021 (as larva), emerged on 30-VII-2021 (Fig. 3A).

2. *Trachys reitteri* Obenberger, 1930

Fig. 7B–D

Host plant. Fabaceae: *Amphicarpaea edgeworthii* (Yano 1952), *Pueraria montana* var. *lobata*, *Rhynchosia volubilis*, *Glycine max* (Ohmomo and Fukutomi 2013), *Glycine soja* (new record).

Leaf mine. White full-depth blotch mine on mature leaflet. Egg is laid along anterior margin of a leaflet, and the mine expands toward leaf base. Frass is granular and distributed all over the mine.

Materials examined. Kiso-Fukushima, Nagano Pref., 10-VIII-2019 (as larva on *A. edgeworthii*), emerged on 23-VII-2019 (Fig. 7B) Hirogawara, Yamanashi Pref., 30-VII-2018 (as larva on *A. edgeworthii*) (Fig. 7C); Kawaguchi-ko Lake, Yamanashi Pref., 20-IX-2014 (as pupa on *G. soja*), emerged on 1-X-2014 (Fig. 7D).

3. *Trachys tokyoensis* Obenberger, 1940

Fig. 7E

Host plant. Fabaceae: *Desmodium podocarpum* subsp. *oxyphyllum* (Yano 1952), *Desmodium podocarpium* subsp. *fallax* (new record).

Leaf mine. Brown full-depth blotch mine on mature leaflet. Egg is laid along anterior margin of a leaflet, and the mine expands toward leaf base. Frass is granular and distributed all over the mine.

Material examined. Kawaguchi-ko Lake, Yamanashi Pref., 19-IX-2017 (as pupa on *Desmodium podocarpium* subsp. *fallax*), emerged on 10-X-2017 (Fig. 7E).

4. *Trachys toringoi* Y. Kurosawa, 1951

Fig. 7F

Host plant. Rosaceae: *Chaenomeles japonica*, *Malus sieboldii* (Yano 1952), *Cydonia oblonga*, *Malus pumila*, *Pyrus pyrifolia*, *Amelanchier asiatica* (Kurosawa 1959).

Leaf mine. Brown blotch mine on mature leaf. Egg is laid in an inner basal area of leaf blade, and the mine expands toward leaf top. Frass is granular and distributed all over the mine.

Material examined. Hara-mura, Suwa, Nagano Pref., 15-VIII-2018 (as vacant mine of *Chaenomeles japonica*) (Fig. 7F).

5. *Trachys inconspicuus* E. Saunders, 1873

Fig. 7G

Host plant. Rosaceae: *Prunus mume*, *P. salicina* (Yano 1952).

Leaf mine. White full-depth blotch mine on mature leaf. Egg is laid along leaf margin, and the mine expands along leaf margin. Frass is granular and distributed all over the mine.

Material examined. Kamikoma, Yamashiro, Kizugawa, Kyoto Pref., 17-VI-2016 (as pupa on *Prunus mume*), emerged on 19-VI-2016 (Fig. 7G).

6. *Trachys pecirkai* Obenberger, 1925

Fig. 8A

Host plant. Ulmaceae: *Ulmus davidiana* var. *japonica* (Ohmomo and Fukutomi 2013).

Leaf mine. Brown full-depth blotch mine on mature leaf. Egg is laid near midrib, and the mine expands along lateral vein and then along leaf margin. Frass is granular and distributed all over the mine.

Material examined. Suekawa, Kaida, Kiso, Nagano Pref., 5-VIII-2022 (as vacant mine of *Ulmus davidiana* var. *japonica*) (Fig. 8A).

7. *Trachys cupricolor* E. Saunders, 1873

Fig. 8B, C

Host plant. Ulmaceae: *Zelkova serrata* (Ohmomo and Fukutomi 2013).

Leaf mine. Dark brown full-depth blotch mine on mature leaf. Egg is laid along midrib, and the mine expands along leaf margin. Frass is granular and distributed all over the mine.

Material examined. Mt. Ibuki, Maibara, Shiga Pref., 29-VII-2020 (as pupa on *Zelkova serrata*), emerged on 25-VIII-2020 (Fig. 8B, C).

8. *Trachys yanoi* Y. Kurosawa, 1959

Fig. 8D–F

Host plant. Ulmaceae: *Zelkova serrata* (Kurosawa 1959).

Leaf mine. Brown full-depth blotch mine on mature leaf. Egg is laid along leaf margin, and the mine expands along leaf margin. Frass is granular and distributed all over the mine.

Material examined. Mt. Shizuhata, Aoi-ku, Shizuoka, Shizuoka Pref., 27-VI-2018 (as pupa on *Zelkova serrata*), emerged on 12-VII-2018 (Fig. 8D–F).

9. *Trachys griseofasciatus* E. Saunders, 1873

Fig. 8G, H

Host plant. Cannabaceae: *Aphananthe aspera* (Yano 1952), *Celtis sinensis* (Ohmomo and Fukutomi 2013).

Figure 8. Leaf mines of *Trachys* spp. on leaves of Ulmaceae and Cannabaceae **A** *T. pecirkai* on *Ulmus davidiana* var. *japonica* **B–D** *T. yanoi* on *Zelkova serrata* **E, F** *T. cupricolor* on *Zelkova serrata* **G, H** *T. griseofasciatus* on *Aphananthe aspera* **I** *T. ineditus* on *A. aspera* **J–L** *T. broussonetiae* on *Broussonetia kazinoki* (**J**) and *Fatoua villosa* (**K, L**). Arrows indicate oviposition scars.

Leaf mine. Dark brown full-depth blotch mine on mature leaf. Egg is laid along anterior leaf margin, and the mine expands along leaf margin. Frass is thread-like and distributed all over the mine.

Material examined. Demachi-yanagi, Shimogamo, Sakyo, Kyoto Pref., 1-VII-2020 (as pupa on *Aphananthe aspera*), emerged on 7-VIII-2020 (Fig. 8G, H).

10. *Trachys ineditus* E. Saunders, 1873

Fig. 8I

Host plant. Cannabaceae: *Aphananthe aspera* (Ohmomo and Fukutomi 2013).

Leaf mine. White full-depth blotch mine on mature leaf. Egg is laid along leaf margin, and the mine expands along leaf margin. Frass is granular and distributed all over the mine.

Material examined. Mukoujima, Uji, Kyoto Pref., 15-VII-2012 (as larva on *Aphananthe aspera*), emerged on 28-VII-2012 (Fig. 8I).

11. *Trachys broussonetiae* Y. Kurosawa, 1985

Fig. 8J–L

Host plant. Moraceae: *Broussonetia kazinoki* (Yano 1952), *Fatoua villosa* (new record). The latter species is unique for host plants of Tracheini, because it is a herbaceous species.

Leaf mine. White full-depth blotch mine on mature leaf. Egg is laid along leaf margin, and the mine expands along leaf margin. Frass is granular and distributed all over the mine.

Materials examined. Chigonosawa, Kiso-fukushima, Kiso, Nagano Pref., 4-VIII-2018 (as larva on *Broussonetia kazinoki*), emerged on 30-VIII-2018 (Fig. 8J); Mumyodani, Niimi, Okayama Pref., 27-IX-2013 (as larva on *Fatoua villos*), emerged on 5-X-2013 (Fig. 8K, L).

12. *Trachys variolaris* E. Saunders, 1873

Fig. 9A–C

Host plant. Fagaceae: *Quercus glauca*, *Q. serrata*, *Q. variabilis* (Yano 1952), *Q. hondae* (new record).

Leaf mine. Gray full-depth blotch mine on mature leaf. Egg is laid near leaf margin, and the mine expands along leaf margin. Frass is granular and distributed all over the mine.

Material examined. Inohae-keikoku, Kitago, Nichinan, Miyazaki Pref., 16-VI-2019 (as larva on *Quercus hondae*), emerged on 19-VII-2019 (Fig. 9A, B); Suizu, Tsuruga, Fukui Pref., 14-VII-2021 (as larva on *Q. glauca*), emerged on 21-VII-2021 (Fig. 9C); Suizu, Tsuruga, Fukui Pref., 19-VIII-2019 (as pupa on *Q. serrata*), emerged on 23-VIII-2019.

13. *Trachys dilaticeps* Gebhardt, 1929

Fig. 9D–F

Host plant. Fagaceae: *Castanopsis sieboldii* subsp. *lutchuensis* (Ohmomo and Fukutomi 2013).

Leaf mine. Gray full-depth linear-blotch mine on mature leaf. Egg is laid along midrib near leaf tip, and the mine expands downwards along leaf margin. Frass is granular and distributed all over the mine.

Material examined. Mt. Nishime, Kunigami, Okinawa Pref., 6-VI-2018 (as larva on *Castanopsis sieboldii* subsp. *lutchuensis*), emerged on 6-VII-2018 (Fig. 9D, E); Komi, Iriomote Is., Yaeyama, Okinawa Pref., 4-VI-2018 (as vacant mine of *C. sieboldii* subsp. *lutchuensis*); Yakukachi, Sumiyo, Amami, Kagoshima Pref., 25-V-2017 (as larva on *Castanopsis sieboldii* subsp. *lutchuensis*), emerged on 15-VI-2017 (Fig. 9F).

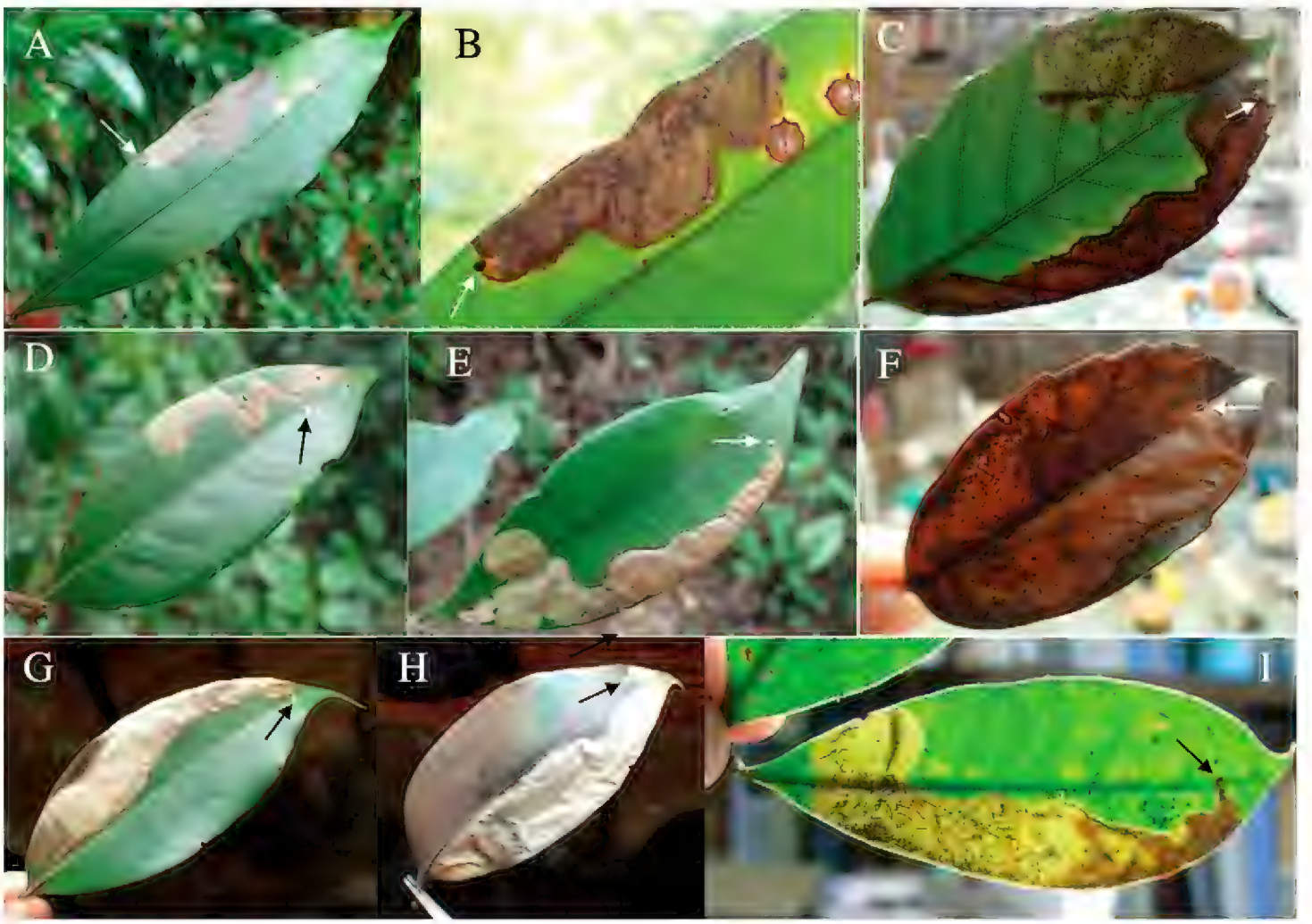

Figure 9. Leaf mines of *Trachys* spp. on leaves of Fagaceae **A–C** *T. variolaris* on *Quercus hondae* (**A, B**) and *Quercus serrata* (**C**) **D–F** *T. dilaticeps* on *Castanopsis sieboldii* subsp. *lutchuensis* **G–I** *T. robustus* on *Castanopsis sieboldii* subsp. *sieboldii*. Arrows indicate oviposition scars.

14. *Trachys robustus* E. Saunders, 1873

Fig. 9G–I

Host plant. Fagaceae: *Castanopsis sieboldii* subsp. *sieboldii* (Yano 1952).

Leaf mine. Gray full-depth linear-blotch mine on mature leaf. Egg is laid along midrib near leaf tip, and the mine expands downwards along leaf margin. Frass is granular and distributed all over the mine.

Material examined. Mt. Shizuhata, Aoi-ku, Shizuoka, Shizuoka Pref., 27-VI-2018 (as larva on *Castanopsis sieboldii* subsp. *sieboldii*), emerged on 13-VII-2018 (Fig. 9G, H); Suizu, Tsuruga, Fukui Pref., 11-VIII-2018 (as larva on *C. sieboldii* subsp. *sieboldii*), emerged on 5-X-2018 (Fig. 9I).

15. *Trachys minutus salicis* (Lewis, 1893)

Fig. 10A–C

Host plant. Salicaceae: *Salix caprea*, *S. miyabeana* subsp. *gymnolepis*, *S. vulpina*, *Populus maximowiczii* (Yano 1952), *Salix reinii* (new record).

Leaf mine. Brown full-depth blotch mine on mature leaf. Egg is laid just near leaf tip, and the mine expands downwards along leaf margin. Frass is granular and connected.

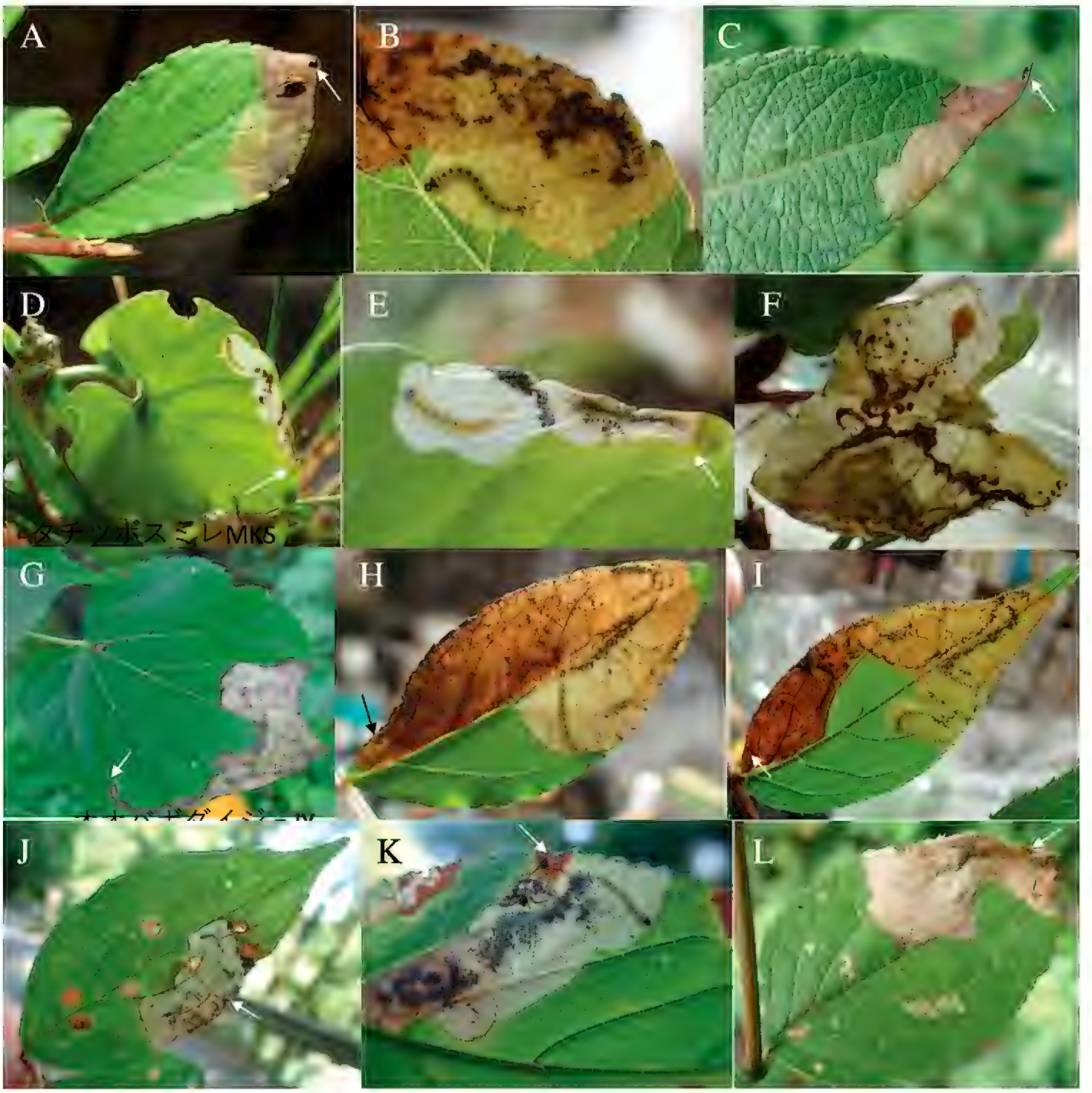

Figure 10. Leaf mines of *Trachys* spp. on leaves of Salicaceae, Violaceae, Malvaceae, and Hydrangeaceae. **A–C** *T. minutus* on *Salix reinii* (**A, B**) and *Salix vulpina* (**C**) **D–F** *T. pseudoscrobiculatus* on *Viola grypoceras* **G** *T. aurifluus* on *Tilia maximowicziana* **H, I** *T. saundersi* on *Deutzia crenata* (**H**) and *Deutzia gracilis* (**I**) **J–L** *T. tsusimae* on *Deutzia scabra*. Arrows indicate oviposition scars.

Material examined. Matsuo-kozan, Hachimantai, Iwate Pref., 7-VII-2018 (as larva on *Salix reinii*), emerged on 30-VII-2018 (Fig. 10A, B); Toyohara, Nasu, Nasu-gun, Tochigi Pref., 7-VII-2022 (as larva on *Salix caprea*) (Fig. 10C).

16. *Trachys pseudoscrobiculatus* Obenberger, 1940

Fig. 10D–F

Host plant. Violaceae: *Viola grypoceras.*

Leaf mine. White full-depth linear-blotch mine on mature leaf. Egg is laid along leaf margin near leaf tip, and the mine expands downwards along leaf margin. Frass is granular and connected.

Material examined. Mt. Mikusa, Kato-shi, Hyogo Pref., 20-V-2018 (as larva on *Viola grypoceras*), emerged on 8-VI-2018 (Fig. 10D–F).

17. *Trachys aurifluus* Solsky, 1875

Fig. 10G

Host plant. Malvaceae: *Tilia maximowicziana*, *T. japonica* (Kurosawa 1959).

Leaf mine. Brown full-depth linear-blotch mine on mature leaf. Egg is laid near leaf margin, and the mine expands along leaf margin. Frass is granular and distributed all over the mine.

Material examined. Iyari, Inao, Omachi, Nagano Pref., 1-VII-2013 (vacant mine of *Tilia maximowicziana*) (Fig. 10G).

18. *Trachys saundersi* Lewis, 1893

Fig. 10H, I

Host plant. Hydrangeaceae: *Deutzia crenata* (Yano 1952), *D. gracilis* (new record).

Leaf mine. Brown full-depth blotch mine of whole layers of leaf blade. Egg is laid along leaf margin near leaf base, and the mine expands upwards along leaf margin. Frass is granular and loosely connected.

Material examined. Makido, Niimi, Okayama Pref., 1-VII-2018 (as larva on *Deutzia crenata*), emerged on 17-VII-2018 (Fig. 10H); Donden, Sado, Niigata Pref., 13-VII-2019 (as larva on *Deutzia crenata*), emerged on 16-VIII-2019; Mt. Toyoguchi, Ooshika, Shimoina, Nagano Pref., 2-VIII-2020 (as larva on *Deutzia gracilis*), emerged on 5-IX-2020 (Fig. 10I).

19. *Trachys tsusimae* Obenberger, 1922

Fig. 10J–L

Host plant. Hydrangeaceae: *Deutzia crenata* (Ohmomo and Fukutomi 2013), but this record may be doubtful. *Deutzia scabra* (new record). We obtained adults from only *D. scabra*.

Leaf mine. Brown full-depth blotch mine on mature leaf. Egg is laid along leaf margin, and the mine expands along leaf margin. Frass is granular and distributed all over the mine.

Material examined. Mt. Osuzu, Tsuno, Miyazaki Pref., 14-VII-2021 (as larva on *Deutzia scabra*), emerged on 27-VII-2021 (Fig. 10J, K); Sakai-gawa, Takaoka, Miyazaki, Miyazaki Pref., 18-VII-2018 (as larva on *Deutzia scabra*), emerged on 1-VIII-2018 (Fig. 10L).

20. *Trachys cuneiferus* Y. Kurosawa, 1959

Host plant. Unknown.

Leaf mine. Unknown.

Discussion

After adding the two new species, we counted 34 trachyine species in the Japanese Archipelago (Table 1). Among these 34 species, host plants are known for 32, which are narrowly host-specific. All host plants are angiosperms belonging to ten orders of eudicots (Rosales, Fabales, Fagales, Malpighiales, Malvales, Cornales, Oxalidales, Myrtales, Santalales, and Ericales), suggesting that they are not associated with basal angiosperms, monocots, Saxifragales, Caryophyllales, or euasterids. From the standpoint of the life form of the host plant, 28 trachyine species are associated with woody plants (18 with trees, 10 with shrubs), three with subwoody climbing plants, and one with herbaceous plants. These results suggest that trachyine species have evolved from wood-borers associated with eudicots.

Table 1. A list of Japanese species of the tribe Trachyini, with their host plant species.

Buprestids		Host plants				
Genus	**Species**	**Subclass**	**Order**	**Family**	**Genera**	**Habit**
Habroloma	*subbicorne*	Rosids	Rosales	Rosaceae	*Rubus*	evergreen/ deciduous shrub
	atronitidum			Rosaceae	*Rubus*	deciduous shrub
	marginicolle			Rosaceae	*Rubus*	evergreen shrub
	asahinai			Rosaceae	*Rubus*	evergreen shrub
	lewisii			Rosaceae	*Rosa*	deciduous shrub
	griseonigrum		Fagales	Fagaceae	*Quercus*	evergreen/ deciduous tree
	yuasai			Juglandaceae	*Platycarya*	deciduous tree
	elaeocarpusi n. sp		Oxalidales*	Elaeocarepaceae*	*Elaeocarpus**	evergreen tree
	bifrons		Geraniales?	Geraniaceae ?	*Geranium*?	perennial ?
	nixilla insuicola		Myrtales	Lythraceae	*Lagerstroemia*	deciduous tree
	taxillusi n. sp		Santalales*	Loranthaceae*	*Taxillus**	evergreen epiphyte
	eximium eximium	Asterids	Ericales	Symplocaceae	*Symplocos*	evergreen tree
	eximium eupoetum			Symplocaceae	*Symplocos*	evergreen tree
	liukiuense			Symplocaceae	*Symplocos*	evergreen shrub
	hikosanense			?	?	?
Trachys	*auricollis*	Rosids	Fabales	Fabaceae	*Pueraria*	deciduous liana
	reitteri			Fabaceae	*Amphicarpaea*, *Glycine*, *Pueralia*, *Rhynchosia*	deciduous liana
	tokyoensis			Fabaceae	*Desmodium*	perennial
	toringoi		Rosales	Rosaceae	*Amelanchier*, *Chaenomeles*, *Cydonia*, *Malus*, *Pyrus*	deciduous tree
	inconspicuus			Rosaceae	*Prunus*	deciduous tree
	pecirkai			Ulmaceae	*Ulmus*	deciduous tree
	cupricolor			Ulmaceae	*Zelkova*	deciduous tree
	yanoi			Ulmaceae	*Zelkova*	deciduous tree
	griseofasciatus			Cannabaceae	*Aphananthe*, *Celtis*	deciduous tree
	ineditus			Cannabaceae	*Aphananthe*	deciduous tree
	broussonetiae			Moraceae	*Broussonetia*, *Fatoua**	deciduous tree/ annual
	variolaris		Fagales	Fagaceae	*Quercus*	evergreen tree
	dilaticeps			Fagaceae	*Castanopsis*	evergreen tree
	robustus			Fagaceae	*Castanopsis*	evergreen tree
	minutus salicis		Malpighiales	Salicaceae	*Salix*, *Poplus*	deciduous tree
	pseudoscrobiculatus			Violaceae	*Viola*	perennial
	aurifluus		Malvales	Malvaceae	*Tilia*	deciduous tree
	saundersi	Asterids	Cornales	Hydrangeaceae	*Deutzia*	deciduous shrub
	tsusimae			Hydrangeaceae	*Deutzia*	deciduous shrub
	cuneiferus		?	?	?	?

* new records.

The host plant genera of the two new trachyine species are *Elaeocarpus* and *Taxillus*, belonging to Elaeocarpaceae (Oxalidales) and Loranthaceae (Santalales), respectively, and representing the first records in Tracheini for both families and orders, while both plant families have been recorded as hosts for *Agrilus* (Jendek & Poláková, 2014). The record on *Taxillus* is also the first record of buprestids associated with epiphytic, plant-parasitic plants.

Our records of leaf mines suggest that those of trachyine species are generally full-depth blotch mines on mature leaves of woody or subwoody plants, except for one species (*Trachys pseudoscrobiculatus*) associated with *Viola*. These leaf mines contrast with upper-layer mines on young leaves formed by agromyzids, epidermal/mesophyll mines on young leaves formed by gracillariids, thin full-depth linear mines formed by Lyonetiidae, and full-depth linear-blotch mines on young leaves formed by Eriocraniidae.

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